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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/462,109	12/30/1999	MASAHICO HIROSE		4688

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EXAMINER

ROCHE, LEANNA M

ART UNIT	PAPER NUMBER
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1771

18

DATE MAILED: 12/18/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/462,109

Applicant(s)

HIROSE ET AL.

Examiner

Leanna Roche

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 September 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3 and 5 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3 and 5 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- ☐ Interview Summary (PTO-413) Paper No(s) _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

DETAILED ACTION

1. The amendments filed September 26, 2002 have been entered and carefully considered. Claims 1-3 and 5 are pending in this application.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1-3 and 5 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a composite reverse osmosis membrane comprising a polyamide skin layer formed on a porous support wherein the polyamide skin layer is formed by

...coating on a porous support a solution A comprising one or more compounds having at least two reactive amino groups; contacting this layer with a solution B comprising one or more polyfunctional acid halide compounds; and further contacting the layer with another solution C comprising one or more polyfunctional acid halide compounds of a concentration higher than the solution B...

does not reasonably provide enablement for a composite reverse osmosis membrane comprising a polyamide skin layer formed on a porous support wherein the polyamide skin layer has no specifically defined chemical structure and only constitutes a generic

polyamide skin layer. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make the invention commensurate in scope with these claims. Presently, Applicant's claims merely set forth physical characteristics desired in a generic polyamide skin formed on a generic porous support and do not set forth specific compositions which would meet such characteristics.

Additionally, Applicant's claims do not set forth the necessary ingredients responsible for producing a composite reverse osmosis membrane with the properties claimed by Applicant. Applicant's specification states 1) "A compound included in the solution A has at least two reactive amino groups. This compound is not specifically limited but any of the above-mentioned compounds can be used" (at Page 5, lines 35-36), 2) "Polyfunctional acid halide compounds included in the solutions B and C are not specifically limited to the above-identified compounds" (at Page 7, lines 30-31), and 3) "For the solutions A, B and C, concentrations of the compound having at least two amino groups and of the polyfunctional acid halide compound are not specifically limited as long as the concentration ratio of the polyfunctional acid halide in the solution B to that in the solution C is in the predetermined range" (at Page 7, line 36 to Page 8, line 3). These disclosures appear to indicate that it may be a specific process limitation which produces the proposed properties claimed by Applicant. Therefore, because Applicant's claims do not require this process limitation, the specification does not appear to provide sufficient enablement for the Applicant's claims.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1-3 and 5 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims merely setting forth physical characteristics desired in an article, and not setting forth specific compositions which would meet such characteristics, are invalid as vague, indefinite, and functional since they cover any conceivable combination of ingredients either presently existing or which might be discovered in the future and which would impart the desired characteristics. Thus, the expression

...a contact angle between a surface of the polyamide skin layer and water is no more than 45°, sodium chloride rejection is at least 98%, and permeate flow rate is at least 0.7 m³/m²day when evaluated by using feed water which has pH 6.5, 0.05 weight% of salt, an operation pressure of 5 kgf/cm², and a temperature of 25°C...,

is too broad and indefinite since it purports to cover every "composite reverse osmosis membrane comprising a polyamide skin layer formed on a porous support" which will perform the desired functions regardless of its compositions, and in effect, recites compounds by what is desired that they do rather than what they are. The expression is also too broad since it appears to read upon materials that could not possibly be used to accomplish the purposes intended. See *Ex Parte Slob* (PO Bd App) 157 USPQ 172.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 1-3 and 5 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Ikeda et al. (USPN 5178766).

Ikeda teaches a composite semipermeable membrane for reverse osmosis comprising an ultra-thin polyamide-based membrane laminated on a microporous support. Example 1 of Ikeda discloses a composite semipermeable membrane having a sodium chloride rejection of 98.1% and a water flux of $2.4 \text{ m}^3/\text{m}^2\cdot\text{day}$ when subjected to a reverse osmosis test under a pressure of $15 \text{ kgf}/\text{cm}^2$ at 25°C using 1500 ppm of aqueous sodium chloride solution at pH 6.5. A water flux of $2.4 \text{ m}^3/\text{m}^2\cdot\text{day}$ is equivalent to $0.8 \text{ m}^3/\text{m}^2\cdot\text{day}$ under the test conditions of Applicant's invention. Therefore, this reads on Applicant's polyamide skin on a porous support, Applicant's sodium chloride rejection of at least 98%, and Applicant's permeate flow rate of at least $0.7 \text{ m}^3/\text{m}^2\cdot\text{day}$ (preferably at least $0.8 \text{ m}^3/\text{m}^2\cdot\text{day}$) using feed water at pH 6.5, 0.05 weight% of salt, operation pressure of $5 \text{ kgf}/\text{cm}^2$ at 25°C . The polyamide-based membrane of Ikeda is formed by a polycondensation reaction between a polyfunctional amine and a polyfunctional acid halide. This reads on Applicant's polyamide skin layer formed by reacting a compound having at least two reactive amino groups and a polyfunctional acid halide compound having at least two reactive acid halide groups.

Ikeda does not specifically disclose the value of the water contact angle between the polyamide layer surface and water. However, it appears that reverse osmosis membrane of Ikeda is substantially identical to the presently claimed composite reverse osmosis membrane because both are directed to membranes comprised of a polyamide skin layer on a porous support, the membrane having a sodium chloride rejection of at least 98% and the membrane having a permeate flow rate of at least $0.7 \text{ m}^3/\text{m}^2\cdot\text{day}$ ($0.8 \text{ m}^3/\text{m}^2\cdot\text{day}$ in Claim 5). Thus, it is believed by the examiner that reverse osmosis

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membrane of Ikeda inherently possesses a polyamide skin layer with a water contact angle within Applicant's presently claimed ranges. Additionally, the presently claimed water contact angle between the polyamide layer surface and water would have obviously been present once the reverse osmosis membrane of Ikeda was provided. See *In re Best*, 195 USPQ 433 footnote 4 (CCPA 1977) as to the providing or this rejection under 35 USC 102 as well as 35 USC 103.

9. Claims 1-3 and 5 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Hirose et al. (USPN 6171497).

Hirose is directed to a highly permeable composite reverse osmosis membrane comprising a polyamide-based skin layer laminated on a microporous support. Hirose discloses a composite reverse osmosis membrane having a sodium chloride rejection of 99% or more and a water flux of $1.5 \text{ m}^3/\text{m}^2\cdot\text{day}$ or more when evaluated using a solution of 500 ppm sodium chloride at pH 6.5 at an operating pressure of 7.5 kgf/cm^2 and a temperature of 25°C . A water flux of $1.5 \text{ m}^3/\text{m}^2\cdot\text{day}$ is equivalent to $0.97 \text{ m}^3/\text{m}^2\cdot\text{day}$ under the test conditions of Applicant's invention. Therefore, this reads on Applicant's polyamide skin on a porous support, Applicant's sodium chloride rejection of at least 98%, and Applicant's permeate flow rate of at least $0.7 \text{ m}^3/\text{m}^2\cdot\text{day}$ using feed water at pH 6.5, 0.05 weight% of salt, operation pressure of 5 kgf/cm^2 at 25°C . The polyamide-based skin of Hirose is formed by polycondensation of a compound having two or more reactive amino groups and a polyfunctional acid halide compound having two or more reactive acid halide groups. This reads on Applicant's Claim 3.

Hirose does not specifically disclose the value of the water contact angle between the polyamide layer surface and water. However, it appears that reverse osmosis membrane of Hirose is substantially identical to the presently claimed composite reverse osmosis membrane because both are directed membranes comprised of a polyamide skin layer on a porous support, the membrane having a sodium chloride rejection of at least 98% and the membrane having a permeate flow rate of at least $0.7 \text{ m}^3/\text{m}^2\cdot\text{day}$ ($0.8 \text{ m}^3/\text{m}^2\cdot\text{day}$ in Claim 5). Thus, it is believed by the examiner that reverse osmosis membrane of Hirose inherently possesses a polyamide skin layer with a water contact angle within Applicant's presently claimed ranges. Additionally, the presently claimed water contact angle between the polyamide layer surface and water would have obviously been present once the reverse osmosis membrane of Hirose was provided. See *In re Best*, 195 USPQ 433 footnote 4 (CCPA 1977) as to the providing of this rejection under 35 USC 102 as well as 35 USC 103.

Response to Arguments

10. Applicant's arguments with respect to Tomaschke et al. (USPN 5254261), Rice et al. (USPN 6132804), Cadotte et al. (USPN 4888116), JP 10-033958, and JP 10-033959 have been considered but are moot in view of the new ground(s) of rejection.

11. It is noted that JP 10-033958 and JP 10-033959 disclose a water flux equivalent to $0.7 \text{ m}^3/\text{m}^2\cdot\text{day}$, if one multiplies $2.1 \text{ m}^3/\text{m}^2\cdot\text{day}$ by $1/3$, rather than rounding $1/3$ to 0.33. However, the rejections over JP 10-033958 and JP 10-033959 have been

withdrawn because upon further review JP 10-033958 and JP 10-033959 are not prior art under 35 USC 102.

12. In response to applicant's argument that Hashino is nonanalogous art, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, Hashino is relied upon to show that it is known in the membrane art that a smaller membrane-water contact angle causes higher wettability to water, and in turn, results in higher water permeability. Because Applicant's invention is directed to increasing the water flux value of their membrane, Hashino discloses information that is pertinent to the particular problem with which Applicant is concerned.

13. In response to applicant's argument that Hancock is nonanalogous art, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, Hancock is directed to the production of materials which may be useful in aqueous separation processes such as reverse osmosis. Hancock is relied upon to define the meaning of a water contact angle with regards to a polymeric material useful in reverse osmosis. Hancock states that a low water contact angle is the measurement used to indicate hydrophilicity in polymeric articles and also states that it is known in the

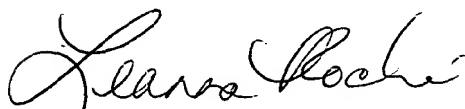
art of membranes that a hydrophilic and wettable surface on a porous polymer promotes uniform filtration and increases the recovery of both filtrate and retentate. Therefore, because Applicant's claims are directed to a low water contact angle, and because Hancock defines the meaning of a low water contact angle measurement with regards to a polymeric material useful in reverse osmosis, Hancock discloses information that is pertinent to the particular problem with which Applicant is concerned.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leanna Roche whose telephone number is 703-308-6549. The examiner can normally be reached on Monday through Friday from 8:30 am to 6:00 pm (with alternate Mondays off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Terrel Morris can be reached on 703-308-2414. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.



lmr
December 10, 2002



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